

## SPECIFICATION

### TITLE OF INVENTION

MCM Window Removal System

### 2. CROSS-REFERENCE TO RELATED APPLICATIONS

Not Applicable

### 3. STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

Not Applicable

### 4. REFERENCE TO SEQUENCE LISTING, A TABLE, OR A COMPUTER PROGRAM LISTING COMPACT DISK APPENDIX

Not Applicable

### 5. BACKGROUND OF THE INVENTION

#### 5.1 FIELD OF ENDEAVOR

This invention is related to the construction, demolition and asbestos abatement industries.

#### 5.2 RELATED INFORMATION AND REFERENCES

The Occupational Health and Safety Administration (OSHA), and the U S Environmental Protection Agency (EPA) require conformance with certain regulations when dealing with asbestos and lead in construction. See 29 CFR 1926.1101, being the OSHA Asbestos in Construction Standard and 40 CFR Part 61 Subpart M, being the National Emissions Standard for Hazardous Air Pollutants-Asbestos (NESHAP) enforced by the EPA.

### 5.2.1 OSHA REQUIREMENTS

OSHA requires contractors to implement certain procedures to protect workers who may be potentially exposed "asbestos containing materials"(ACM) that is "any material containing more than one percent asbestos". 29CFR1926.1101(b)

OSHA requires the use of certain engineering controls and work practices for "all operations regardless of exposure". These engineering controls and work practices include the use of "wet methods". 29 CFR 1926.1101(g)  
(ii) OSHA defines removal of window units with asbestos containing caulk as being "Class II asbestos work". 29 CFR 1926.1101 (b)

Class II work practices enumerated at Section (g) (7) include "supervision by a competent person", "impermeable dropcloths", "wet methods", "prompt clean-up", and use of HEPA vacuums. Section (g) (8) (v) establishes work practices for Class II removal of material not otherwise listed. This includes asbestos containing caulk. Work practices include "wet methods", "intact removal", and a prohibition against "cutting, abrading or breaking" the material. Material must be "kept wet until transported to a closed receptacle, no later than the end of the shift."

Section (g) (8) (vi), "Alternative Work Practices" permits the employer to "use different or modified engineering and work practice controls if . . . (A) The employer shall demonstrate . . . that employee exposures will not exceed the PELs under any anticipated circumstances." PEL is "Permissible exposure limits" defined as "the airborne concentration of asbestos" above which no employees shall be exposed, and "(B) A competent person shall evaluate the work area, the projected work practices and the engineering controls, and shall certify in writing, that the different or modified controls are adequate to reduce direct and indirect employee exposures to below the PEL s under all expected conditions of use and that the method meets the requirements of this Standard.

Additional OSHA requirements include establishing "regulated areas"

29 CFR1926.1101(e), labeling and training requirements 29 CFR1926.1101 (k) (9).

### 5.2.2 EPA REQUIREMENTS

The Environmental Protection Agency has numerous regulations that apply to the removal and disposal of ACM and the training requirements for workers. Among these regulations is the National Emissions Standard for Hazardous Air Pollutants - Asbestos (NESHAP). This regulation defines the categories of asbestos containing materials (ACM) including "regulated asbestos-containing material (RACM), Category I nonfriable ACM, and Category II nonfriable ACM.

Subject to quantity cutoffs ( $\geq 260$  lb, 160 sf or 35ft<sup>3</sup>) NESHAPS requires the removal of all RACM and Category II nonfriable ACM prior to demolition of a facility.

NESHAP requires all asbestos removal to be conducted in a manner that will create "no visible emissions" to the outside air during removal, handling, transportation or disposal. ACM must be wetted. Containers must be labeled, for transportation and during loading.

### 5.3 PROBLEMS WITH PRIOR ART

The industry standard for removal of window units with asbestos containing caulk, the previous state-of-the-art technology, required manual removal of the metal window units by certified asbestos workers. This was often accomplished using manlifts and scaffolding as work platforms with forklifts or block and tackle used to lower the units after they had been manually disconnected from the building structure or framing.

In industrial settings, the work often requires workers to climb in structural steel to gain access to the window units. Even with safety harnesses and life lines, fall exposures are created. Oxy-acetylene torches are often used to detach the units

from the structure. Torch cutting, even with a fire watch, increases the risk of structure fires, property loss and worker injury.

### 5.3 PROBLEMS WITH PRIOR ART (continued)

This manual removal process is fraught with danger. Worker injury or death from slips and falls, cuts, eye injury from fragmented glass, manlift accidents, falling objects injury, and burns are all increased by manual removal process.

The manual removal process requires a minimum of four workers – two "up" disconnecting the window unit and securing it to be lowered to the ground, and two "down", to receive the units and place them into disposal containers. Beyond the safety exposures involved, the process itself is expensive and inefficient.

These problems are exacerbated when the window units are at significant height. The MCM system using a CAT 345 UHD excavator and CAT MP 20 shear can safely reach and remove windows eighty feet above ground.

## 6. BRIEF SUMMARY OF THE INVENTION

### 6.1 GENERAL

The MCM Window Removal System is a mechanical method of removing window units with asbestos containing caulk which minimizes safety exposures of ground-based laborers and is consistent with existing federal regulatory requirements. The system increases efficiency and thereby reduces cost. Combining available mechanical systems, ex. a CAT 345 UHD excavator with CAT MP20 multi-processor tool (or alternative combination of machine and tool), with point of contact plumbing attachment allowing water to be applied at the tip of the attachment, controlled at the cab, together with a written procedure incorporating OSHA and EPA regulatory requirements is a new standard for the demolition, construction and asbestos industries.

## 6.2 ADVANTAGES, SOLUTIONS TO PREVIOUS PROBLEMS

The MCM Window Removal System contributes substantial advantages to the target industries. The system increases productivity, lowers costs, and increases worker safety and environmental quality.

Eliminating the need for ground-based labor to use manlifts and scaffolding as work platforms to access window units, using forklifts or block and tackle to lower the units after they are manually disconnected from the building structure or framing, negating the use of torch cutting, reducing the crew size required for the operation, and providing wetting at the source of removal without creating slip and fall hazards, all contribute to the benefit of the workers, building owners, employers and the environment.

## 7. BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING

Not Applicable

## 8. DETAILED DESCRIPTION OF THE INVENTION

The U. S. Environmental Protection Agency (EPA) and the Occupational Health and Safety Administration (OSHA) require conformance with certain regulations when dealing with asbestos and lead in construction, including removal of metal casement windows from buildings that have asbestos caulking often painted with lead-based paint. The industry standard is to remove window units manually. This process is fraught with dangers to workers and the environment.

The applicants have invented a process that permits mechanical removal of the contaminated window units while conforming to applicable EPA and OSHA regulations, thereby providing increased safety for workers and the environment.

8. DETAILED DESCRIPTION OF THE INVENTION (continued)

The process involves multiple facets none of which may be eliminated in order to provide compliance. The process includes:

- (1.) Pre-clean the ground or floor area below the window units to be removed.
- (2.) Cover the area below the window units to be removed with polyurethane sheeting or alternative dropcloth material.
- (3.) Configure CAT 345 UHD excavator (demolition platform) with CAT MP20 multi-processor tool (or alternative combinations of machines and tools) with point of contact plumbing attachment allowing water to be applied at the tip of the attachment, controlled at the cab.
- (4.) Engage water spray (fog) and thoroughly wet area below window units to be removed.
- (5.) Move appropriately-sized open top rolloff container to position directly under the window units to be removed. Attach appropriate signage.
- (6.) Engage water spray (fog) and thoroughly wet window units to be removed.
- (7.) Carefully grasp metal frame of window unit using the CAT 345 UHD excavator with CAT MP20 multi-processor tool (or alternative combination of machine and tool), applying force sufficient to secure hold of the window unit without shearing the contact point.
- (8.) Disconnect the window unit by slowly twisting and pulling the unit from the building façade. (Broken glass chards, incidental intact caulk, and paint chips will fall into the rolloff and/or onto the dropcloth.)
- (9.) Carefully lower the window unit to the rolloff directly below.
- (10.) Engage water spray (fog). Thoroughly wet inside the rolloff and the removed window units.
- (11.) Continue process, sliding rolloff along dropcloth to position under next unit to be removed.
- (12.) When process is complete or when dropcloth is to be replaced, police area around dropcloth, pick up fugitive glass chards, incidental caulk, and paint chips and then carefully fold the dropcloth inward upon itself and place into rolloff.

(13.) When rolloff is full, cover with appropriate tarp for transport and disposal at an appropriate disposal site.

## 8. CLAIMS

### 8.1 CLAIM # 1

The applicant, David H. Mardigian, claims that the foregoing Specification describes a "new use of a known process, machine, manufacture, composition of matter, or material." specifically,

- (1.) Use of mechanical means to remove metal window units where the caulk is found to be an "asbestos containing material" as defined at 29 CFR 1926.1101 (b) being the OSHA Asbestos Standard.
- (2.) Use of "point of contact" water spray fog to maintain material in an "adequately wet" condition as required by 40 CFR Part 61 Subpart M being the National Emissions Standard for Hazardous Air Pollutants- Asbestos (NESHAP).
- (3.) Use of accepted regulatory practices in combination with the above, including training, pre-cleaning, wetting, dropcloths, positioning of rolloff, signage, intact removal, and prompt clean-up and disposal.

Applicant claims that he believes that he is the original and first inventor of the described process to combine existing technology in such a manner as to satisfy the regulatory requirements of the above-cited regulations and in so doing invented a new and unique technology not previously used.

This process was first used at the property of General Motors Corporation, Flint NAO North facilities in Flint Michigan, following approval of the concept by the Michigan Department of Consumer and Industry Services on August 23, 2001. The process was later found to be "in compliance with NESHAPS" by representatives of the Michigan Department of Environmental Quality.